

Remarks

Reconsideration and withdrawal of the rejection set forth in the above-mentioned Official Action in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 1-16 remain pending in the application, with Claims 1, 6, 7, 12 and 13 being independent. Claims 1, 6, 7, 12 and 13 have been amended herein.

Claims 1-16 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,576,745 (Matsubara) in view of European Patent Application No. 0 569 201 (Ohshima et al.). This rejection is respectfully traversed.

With the arrangements recited in the independent claims, a threshold drive energy or a threshold drive condition between a condition where an ink ejection of an ink jet printhead was induced and a condition where ink ejection of the ink jet printhead was not induced is judged or determined using a value for each supplied drive energy and a value for each monitored temperature. With such an arrangement and method, the threshold drive energy or threshold drive condition can be referred to without the necessity of direct detection of actual ejection or non-ejection. As a result, a drive condition can be set or determined based on the judged drive energy.

Matsubara is directed to energizing a mounted thermal head to determine a thermal change state and setting a driving condition in accordance with the determined state change. Figs. 12 and 15 of Matsubara show two sequential pulses, each having different energy amounts. These are pulses as drive energies, but are not pulses as heat energies to be applied to a printhead under a predetermined condition in order to determine

the size of drive energy. Although Claim 3 of Matsubara recites that detection means detects a temperature change immediately before the start of the heating period and immediately after the end of the heating period, this is merely detection of a temperature change immediately before and after heat energy is applied to the printhead under a predetermined condition each time of exchanging the printhead or starting printing, or at any appropriate time, in order to determine a drive energy for driving the printhead. Note col. 8, lines 52-56. As a result, as is recited in Claim 1 of Matsubara, a drive pulselwidth as a drive condition (corresponding to a pre-pulselwidth of Figs. 12 and 15) is set on the basis of the temperature change.

Applicant submits that the claimed recitation in Matsubara of detecting a temperature's change immediately before start of heating and immediately after the end thereof does not encompass structure for monitoring the temperature change immediately before and after two sequential pulses as shown in Figs. 12 and 15 are applied. In fact, Matsubara does not disclose, teach or suggest any structure that the pulses shown in Figs. 12 and 15 are applied to the printhead, thereby setting the drive condition of the printhead on the basis of the temperature change immediately before and after the application of the pulses. Even if the pulses of Figs. 12 and 15, arguendo, were applied to the printhead in order to set the drive condition, it is apparent from the description that the temperature change would be monitored by detecting a temperature gap between temperatures before applying a pre-pulse and after applying the main-pulse. Accordingly, Matsubara cannot detect a boundary or threshold between an ink ejecting condition and an ink non-ejecting condition.

Accordingly, Matsubara fails to disclose or suggest at least judging a threshold drive energy between a condition where ink ejection of an ink jet printhead was induced and a condition where ink ejection of the ink jet printhead was not induced using a value for each supplied drive energy and a value for each monitored temperature, as is recited in independent Claims 1, 7 and 13. Nor does Matsubara disclose or suggest determining a threshold drive condition between a condition where ink ejection of an ink jet printhead was induced and a condition where the ink ejection of the ink jet printhead was not induced using a value for each supplied drive energy and a value for each monitored temperature, as is recited in independent Claims 6 and 12.

Thus, Matsubara fails to disclose or suggest important features of the present invention recited in the independent claims.

Ohshima et al. relates to a method of judging a discharge state of an ink jet recording head. A predetermined electrical energy E2 not inducing ink discharge is applied and the temperature change of the recording head is measured and subsequently a predetermined energy E1 inducing ink discharge is applied and the temperature change is measured. This is performed to determine an abnormality of the ink ejection state. However, there is no disclosure in Ohshima et al. of determining a boundary or threshold between the ink ejecting state and the ink non-ejecting state by monitoring the temperature change when various energies are applied. Accordingly, Ohshima et al. fails to remedy the deficiencies of Matsubara noted above with respect to the independent claims.

Thus, independent Claims 1, 6, 7, 12 and 13 are patentable over the citations of record. Reconsideration and withdrawal of the § 103 rejection are respectfully requested.

For the foregoing reasons, Applicant respectfully submits that the present invention is patentably defined by independent Claims 1, 6, 7, 12 and 13. Dependent Claims 2-5, 8-11 and 14-16 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

Applicant submits that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,


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